# CLAIMS

What is claimed is:

1. An air pressure proportional damper comprising:

a container having a first chamber and a second chamber;

a piston rod slidingly disposed in the first chamber of the container;

a piston attached to the piston rod, the piston being in sliding engagement with walls of the first chamber;

a valve disposed between the first chamber and the second chamber, the valve regulating fluid flow between the first chamber and the second chamber;

a pressure signal supplied from an air spring to the valve;

wherein the valve regulates fluid flow from the first chamber to the second chamber proportional to the pressure signal.

2. The air pressure proportional damper as claimed in Claim 1, further comprising a down tube connecting the first chamber to the valve; and

an outlet connecting the second chamber to the valve, wherein fluid passing from the first chamber to the second chamber passes from the down tube to the outlet.

3. The air pressure proportional damper as claimed in Claim 2, further comprising a first membrane disposed over an end area of the down tube,

wherein the membrane applies a resistance force over the end area of the down tube proportional to the pressure signal.

4. The air pressure proportional damper as claimed in Claim 3, wherein the first membrane comprises a plurality of stacked plates, the plurality of stacked plates having an aperture therein to allow a predetermined amount of fluid flow from the first chamber to the second chamber.

5. The air pressure proportional damper as claimed in Claim 1, wherein the first chamber includes an upper working chamber and a lower working chamber, and wherein the second chamber is a reserve chamber.

6. The air pressure proportional damper as claimed in Claim 1, wherein the pressure signal is transmitted to the valve by a hose, the pressure signal being air pressure supplied by the air spring.

7. An air pressure proportional damper comprising:

a first chamber;

a second chamber;

an air adjustment valve, the first chamber fluidly communicating with the second chamber through the air adjustment valve, wherein the air adjustment valve comprises:

a nipple support supporting a nipple, the nipple having an aperture therethrough, communicating with the first chamber;

a lower membrane having a first side and a second side, the first side of the lower membrane contacting an upper side of the nipple and the aperture;

a plunger supported by a plunger support, a first end of the plunger contacting the second side of the lower membrane;

an upper membrane having a first side and a second side, the first side of the upper membrane contacting a second end of the plunger; and

a hose attachment housing supported by a guiding ring, a space defined by an area between the hose attachment housing, the guiding ring and the second surface of the upper membrane, a spring disposed in the guiding ring that biases the hose attachment housing toward the second side of the membrane;

wherein a second space is defined between the nipple support and the first side of the membrane, the second space communicating with the second chamber.

8. The air pressure proportional damper as claimed in Claim 7, further comprising an air hose attached to the hose attachment housing that supplies air pressure from an air spring into the space.

9. The air pressure proportional damper as claimed in Claim 8, wherein a surface of the hose attachment housing presses against the second side of the second membrane when air pressure supplied from the air spring is below a predetermined value.

10. The air pressure proportional damper as claimed in Claim 8, wherein air pressure supplied from the air spring pressurizes the space to press the upper membrane into the plunger and the plunger against the lower membrane to apply a sealing force to the nipple for restricting fluid flow from the first chamber to the second chamber.

11. An air pressure proportional damper comprising:

a first cylindrical chamber;

a second cylindrical chamber disposed around the first cylindrical chamber;

a piston rod having a valve positioned at an end of the piston rod, the valve and the piston rod being in sliding engagement with walls of the first cylindrical chamber, an area in the first cylindrical chamber proximate the rod defining an upper working chamber, an area on a side of the valve in the cylindrical chamber distal from the rod defining a lower working chamber;

an air adjustment valve positioned at one end of the first cylindrical chamber and the second cylindrical chamber;

a down tube fluidly connecting the first cylindrical chamber to one side of the air adjustment valve, wherein the air adjustment valve regulates flow from the down tube to the second chamber;

wherein the air adjustment valve comprises:

an air adjustment valve main body;

an air adjustment valve lower main body attached to the air adjustment valve main body;

a membrane held in position between the air adjustment valve lower main body and the air adjustment valve main body;

a passage formed in the air adjustment valve main body to communicate air pressure to a top side of the membrane;

a sliding valve slidingly supported by the air adjustment valve lower main body, one end of the sliding valve positioned against a lower side of the membrane, an opposite side of the sliding valve having a valve seat that closes the down tube from passing fluid from the down tube to the second chamber;

a spring positioned between the valve seat and the sliding valve, the spring biasing the sliding valve against the membrane, the spring biasing the valve seat to a closed position.

12. The air pressure proportional damper as claimed in Claim 11, further comprising a hose fluidly connecting an air spring to the upper surface of the membrane.

13. The air pressure proportional damper as claimed in Claim 11, further comprising travel stops affixed to the air adjustment valve lower main body, the travel stops riding in a groove in the sliding valve, the groove being a longer length than the travel stops to set a fixed sliding distance of the sliding valve with respect to the air adjustment valve lower main body.

14. The air pressure proportional damper as claimed in Claim 12, wherein air pressure from the air spring presses the membrane to move the sliding valve in a direction compressing the spring, the spring force pressing the valve seat to apply resistance to flow of fluid from the down tube to the second chamber.

15. The air pressure proportional damper as claimed in Claim 11, wherein an end of the sliding valve proximate the valve seat has a groove therein, the groove allowing a minimal flow of fluid from the down tube to the second chamber.

16. The air pressure proportional damper as claimed in Claim 11, further comprising a threaded clamp having an L-shaped portion at a first end and a threaded portion at a second end, the second end threaded to the air adjustment valve lower main body, the L-shaped first end engaging the air adjustment valve main body to clamp the air adjustment valve main body to the air adjustment valve lower main body.

17. The air pressure proportional damper as claimed in Claim 16, wherein the membrane is clamped between the air adjustment valve main body and the air adjustment valve lower main body.